The red spot has grown extremely faint, and its early disappearance seems very possible. On the other hand, the brilliant white spot fully maintains the striking appearance it presented in 1880, and gives promise of remaining in view for a considerable time. Should the two markings continue visible during the ensuing year, they may be observed at or near conjunction at the following times:—

	h	m	s
1883. Jan. 28	10	3	0
Mar. 13	20	45	13
Apr. 27	7	27	27
June 10	18	9	40
July 25	4	51	53
Sept. 7	15	34	7
Oct. 22	2	16	20
Dec. 5	12	58	33

The bright spot is very variable. There is a wide range in its maxima and minima. On three occasions I have failed to see any sign of it in my 10-inch Browning Reflector, though, at the time of maximum, I have seen it distinctly with a $2\frac{1}{2}$-inch Ramsden object glass. This spot is the central one, and the largest of three near together on the equatorial border of the great southern belt, and is the brightest and most conspicuous of its class. It must not be confused with many other varieties of white spots distributed over the surface of *Jupiter*, which are far less permanent and, in some instances, give different periods of rotation.

Ashley Down, Bristol:
1882, *Nov.* 2.

The Fireball Radiants of August 9–11. By W. F. Denning.

In addition to the brilliant shower of Perseids which returns every year on August 9–11 there are many other meteor streams which, though of minor character, are yet distinctly marked, and occasionally supply fireballs of considerable size. I recently examined a large number of meteor catalogues, and projected the paths of many fireballs recorded on the nights of August 9–11, and, as may be readily inferred, the great majority of these proved to be Perseids, though several other radiants were well indicated by the directions of their flights. I found good showers from points near γ *Cephei*, α *Cygni*, γ *Andromedæ*, γ *Capricorni* and o *Draconis*; also more doubtful positions at $100^\circ + 63^\circ$ $249^\circ + 48^\circ$, $341^\circ + 34^\circ$, $257^\circ + 13^\circ$, $192^\circ + 79^\circ$, $253^\circ - 20^\circ$

355°—8°, and 337°—28°. The two former I regard as particularly well established, and they correspond with showers of ordinary meteors. It may, therefore, be interesting to refer to them in detail, as they are very likely to come under repeated observation in future years.

I. The shower near γ *Cephei* is at 335° + 73°. The paths of sixteen fireballs were found to indicate this position very exactly. Of these the observed flights of thirteen are shown on the accompanying diagram. They were chiefly observed by members of the Italian Meteoric Association in 1872, but the shower is

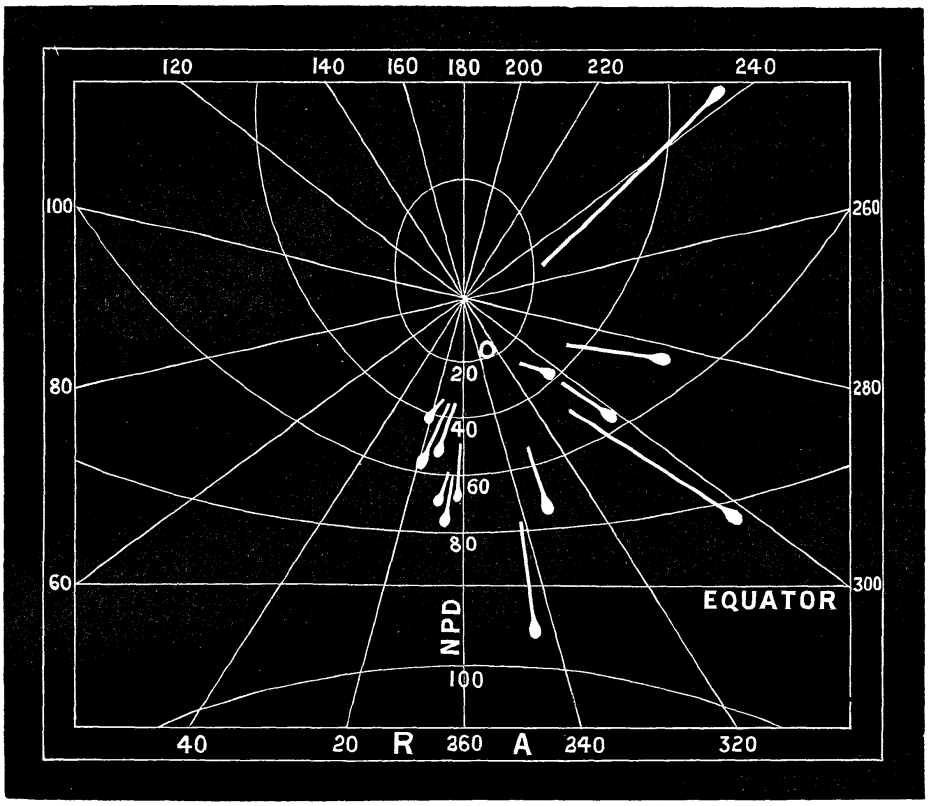

Fig. 1.—Paths of 13 Fireballs (Cepheids), Aug. 9–11.

amply confirmed from other sources. On August 10, 1869, Mr. Backhouse, at Sunderland, saw a bright stationary meteor at 337° + 78°, which obviously belonged to this stream, and on August 10, 1874, a fireball was observed by Prof. Herschel, at Newcastle-on-Tyne, and Mr. Clark, at York, which gave a radiant point at 352° + 72°.* Another meteor doubly observed on August 11, 1871, at Greenwich and Hawkhurst, gave a radiant at 350° + 70° (Waller), "the recorded paths being in very good accordance with a radiant near ψ or ι *Cephei*." † This position

* British Association Report on Luminous Meteors for 1876, p. 138.
† *Ibid.* 1874, pp. 278 and 285.

has also been derived by several meteor observers as giving a contemporary display with the Perseids:—

August 9–12	...	355°+81° Heis (113 meteors)
5	...	315+80 Schiaparelli and Zezioli
6–31	...	335+67 Greg and Herschel
12	...	330+70 Denning
17	...	335+69 Corder
August	...	340+67 Greg (1874)

The mean of the six positions is 335°+72°·4, which is almost coincident with the fireball radiant above referred to. The point of divergence as given by different observers does not agree very closely, but the great altitude of this shower readily explains this, for a radiant near the zenith is always much more difficult to determine with precision than one near the horizon. I believe that the several positions included in the list certainly relate to one and the same stream, and this is rendered additionally probable by the fact that the average place exhibits so close an agreement with the fireball radiant which has been quite independently derived. And if further proof is needed as to the existence of this prominent shower of Cepheids, we have it in the observations of Mr. Clark, at York, on August 5–12, 1871, who, in summarising his results,* says, "A remarkable feature was the outlying radiants, one of which was situated at or near θ *Cassiopeiæ*, and another near the star C of *Camelopardi*. The radiant between δ *Cygni* and γ *Draconis* was very well marked, *also a radiant near* γ *Cephei* [353°+73°], where an almost stationary meteor was observed." The latter shower is unquestionably identical with the one we have now been describing, as the position and epoch are the same.

II. The fireball radiant near α *Cygni* is at 312°+50°, which is already well known as an apparently long-enduring shower visible chiefly in the months of July and August. Mr. Greg† places the centre at 309°+48° from a mean of 15 different estimates, and calls it the *Cygnids I.* It is certainly a stream of considerable richness, and one which, though supplying many shooting stars of ordinary type, is also notable for the occasional exhibition of very large meteors. In looking through the published observations of August 9–11, I found the paths of twelve fireballs which conformed more or less exactly with this radiant, and the observed positions of nine of these are projected on the following diagram.

* *Nature*, August 17, 1871.

† "Table of Radiant Positions and Durations of Meteor Showers visible in the Northern Hemisphere," published in the B. A. Report on Meteors for 1875, p. 159, Radiant No. 81.

Though this shower has not, I believe, been hitherto noticed as affording a conspicuous display of brilliant meteors, it has been seen as a well-defined radiant by nearly all regular observers of meteor showers. Greg and Herschel gave the centre as at 310°+47° (July 6–August 4), Schiaparelli and Zezioli at 304°+49° (July 31) and 304°+44° (August 4), Corder at 304°+48° (August–September), while the writer found it at 315°+50° (July–August 1877). Tupman gives a shower at 310°+58° (August 13), but this is too far N. to be fairly con-

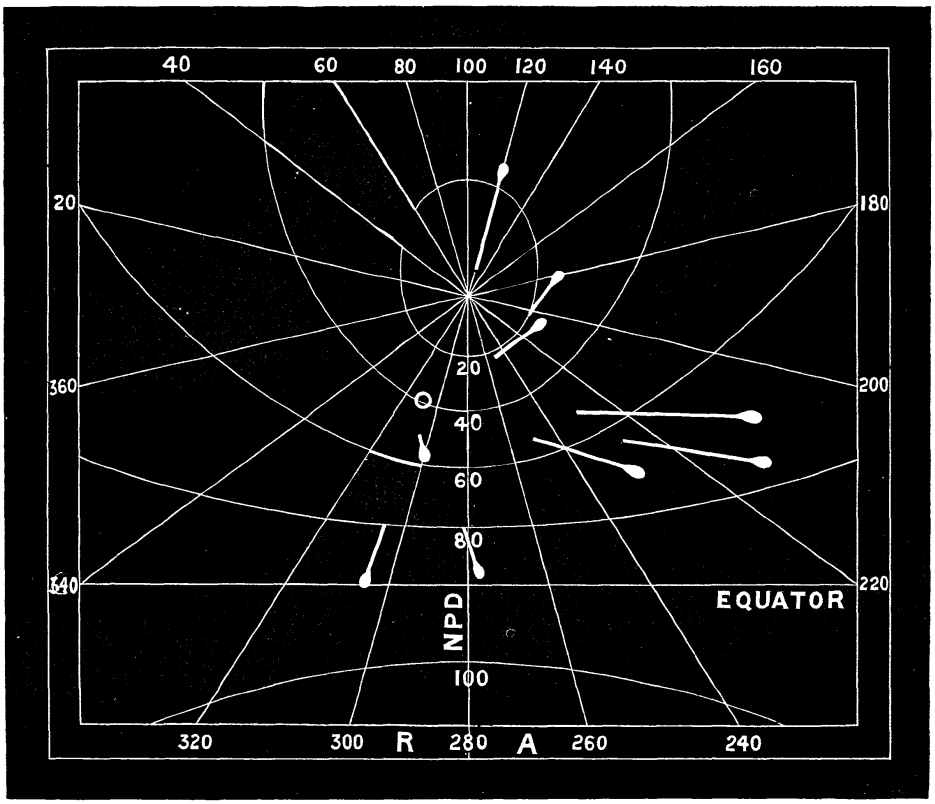

FIG. 2.—Paths of 9 Fireballs (Cygnids), Aug. 9–11.

sidered a return of these Cygnids. It undoubtedly refers to a northerly radiant in *Cepheus*, which we shall refer to later on.

In *Cygnus* and the immediate region hereabout there is a large number of contemporary showers, visible in July–August, which are very liable to confuse observers. Some of these showers lie in the more southerly part of *Cygnus*, others cluster about *α Cygni*, and others again extend northward into *Cepheus*; indeed, this region of the heavens appears to be so rich in meteor streams at this epoch that it is extremely difficult to disassociate them. In comparing the radiants given in various catalogues, they seem to be so numerously distributed in this quarter that it is impossible to group them into reliable positions. I believe, however, there are three active showers here to which the

majority of these observations have reference, and I have derived the following mean positions for July–August:—

(1)	$311^{\circ}\cdot5+47^{\circ}\cdot0$	α Cygnids, mean of 18 radiants.
(2)	$310\cdot4+36\cdot0$	ϵ Cygnids, mean of 14 radiants.
(3)	$311\cdot8+62\cdot3$	α Cepheids, mean of 14 radiants.

There are other and probably less active displays at this period of the year, both from *Cygnus* and *Cepheus*, while E. and W. in *Lacerta* and *Lyra* the sky is teeming with meteor showers. The shower at $311^{\circ}\cdot8+62^{\circ}\cdot3$ (α Cepheids), is quite a separate display to the shower at $335^{\circ}+73^{\circ}$ (γ Cepheids), though its contemporary activity is evident. And the pair of showers near α and ϵ *Cygni* are no doubt equally distinct though not always distinguished from each other owing to their proximity of position. There is, however a difference of 11° in declination, which is sufficiently large to prevent confusing the meteors of the two systems, especially when the motions are chiefly in R.A., and the meteors appear in the region of their radiant point.

Amongst the bright meteor showers of August 9–11 I may refer also to the γ Andromedes ($12^{\circ}+30^{\circ}$) and o Draconids ($284^{\circ}+62^{\circ}$), which are both well ascertained radiants included in Mr. Greg's general catalogue (1875), where they are placed at $7^{\circ}+33^{\circ}$ and $282^{\circ}+60^{\circ}$ from a mean of twelve positions each. It is to these and to the contemporary showers of Cepheids and Cygnids that many fine meteors (non-Perseids) of the August epoch owe their origin. Observers of future returns of the Perseids will, therefore, do well to note the paths of such fireballs as are not conformable to *Perseus*, so that they may be attributed their separate radiant points, and the investigation of these interesting minor showers carried yet further.

Bristol: 1882, *Nov.* 1.

The Electric Light in Observatories. By W. S. Franks.

I wish to bring under the notice of this Society a simple, cheap, and efficient means of obtaining illumination; equally applicable to the micrometer, divided circles, clock face, reading desk, &c. The light is so thoroughly successful that I feel sure it only requires to be made known, and I have Canon Beechey's permission to state freely what I saw of its action in his observatory (Hilgay Rectory, Norfolk) during a long night's work. Two of Swan's smallest incandescent lamps were in use, one for the reading desk and the other in micrometer; and, as they are never required to be both used at once, a switch directs the current from one to the other. The battery consists of four pint-size bichromate cells, the plates being 6 in. × 2 in. A